

Quarterly Report

Date of Report: March 31, 2005

Contract Number: DTRS56-04-T-0001

Prepared for: DOT and GRI

Project Title: Nonlinear Harmonic-based Mechanical Damage Severity Criteria for Delayed Failures in Pipelines

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Public Page (Abstract)

The objectives of the work are to:

- Increase pipeline safety by characterizing strain anomalies in pipes due to gouged dents in terms of the time-evolution of nonlinear harmonic (NLH) signals;
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- Formulate NLH-based defect severity criteria for the remaining lives of mechanically damaged pipelines that can be used in assessing delayed failures;
- Enable NLH technology to be transferred to in-line inspection (ILI) companies through collaboration between SwRI and Tuboscope Inspection Services in developing guidelines and software for implementing the NLH-based criteria.

The intent of the program is to:

- Investigate the capabilities of the NLH method to detect simulated stress corrosion cracking by subjecting the EDM notched pipe sample to various static pressures while inspecting the inside of the sample with a NLH scanner to detect the strain anomalies on the inside surface of the pipe produced by the notches;
- Use NLH scanners to periodically monitor the development of strain anomalies on the inside of the four gouged pipe samples due to the accumulation of fatigue damage from cyclic pressure changes.

Accomplishments include completion of NLH scans on a pressurized pipe containing fifty electric-discharged machined (EDM) notches, and completion of preliminary NLH scans on four pressurized pipes containing gouged dents.